

SUBSTITUTE SEQUENCE LISTING

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<120> CYTOTOXIN-BASED BIOLOGICAL CONTAINMENT

<130> PLOUG1.001APC

<140> US 09/700,130

<141> 2000-11-07

<150> PCT/DK99/00258

<151> 1999-05-07

<150> DK 0627/98

<151> 1998-05-07

<150> US 60/085,067

<151> 1998-05-12

<160> 59

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 51

<212> DNA

<213> Artificial Sequence

<220>

<223> primer relE1B was used for the amplification of
relEK-12 by PCR on pBD2430

<400> 1

ccccggatcc ataaggagtt ttataaatgg cgtattttct ggattttgac g 51

<210> 2

<211> 38

<212> DNA

<213> Artificial Sequence

<220>

<223> primer relE1B was used for the amplification of
relEK-12 by PCR on pBD2430

<400> 2

ccccctcga ggtcgactca gagaatgcgt ttgaccgc 38

<210> 3

<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> primer RelB-p307/1 was used for the generation of
a PCR-fragment from pNZ945

<400> 3
cccccggatc ccagtcttga aaggtggc

28

<210> 4
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> primer RelB-p307/2 was used for the generation of
a PCR-fragment from pNZ945

<400> 4
cccccgaatt ctcataggta tttatccag

29

<210> 5
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> primer relE-p307/3 was used to PCR-amplify the
gene relEP307 from pNZ945

<400> 5
ccccggatcc agatctggat aaatacc

27

<210> 6
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> primer relE-p307/2 was used to PCR-amplify the
gene relEP307 from pNZ945

<400> 6
ccccgaatt cgtaactttc tgtgtttatt gc

32

<210> 7
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
 <223> primer relE-p307/4 was used for the generation of
 a DNA fragment encoding relEP307 by PCR

<400> 7
 ccccgagct cagatctgga taaatacc 28

<210> 8
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Primer relE-P307/5 was used for the generation of
 a DNA fragment encoding relEP307 by PCR

<400> 8
 ccccgcatg cgtaactttc tgtgtttatt gc 32

<210> 9
 <211> 1444
 <212> DNA
 <213> E. coli K-12

<220>
 <221> misc feature
 <222> (1)...(1444)
 <223> n = A,T,C or G

<400> 9
 cttaatttca ggccccatcg gatcacacat ggagagtttt tatgaataac cccgtctgtc 60
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 tttctgccgc atgcgggtgtg tgcataaaac gtgttacgtt cctttatcga caggtcaggt 180
 caccgcctac ccgccgacga gaaagcaaca ctgacatgct aaagcaaaaa atagatgaat 240
 aagttgagtt gtgcataatg agcctgaccg tcacaaagta tatgggtgct gtaccagtaa 300
 gatgatggcc ggactcttta aaaacgagct gacctgcaca atacaggatg gacttagcaa 360
 tggctgctcc tggcacaaaag cggacagtga tcaccgttct tacgactact tctcgacttc 420
 ctctgctgact tgccctaaagc atgttttagt rbrmrarbst artgcgatac ttgtaatgac 480
 atttgaatt acaagagggtg taagacatgg gtargcatta acctgcgtat tgacgatgaa 540
 cttaaagcgc gttcttacgc cgcgcttgaa aaaatgggtg taactccttc tgaagcgctt 600
 cgtctcatgc tcgagtatat cgctgacaat gaacgcttgc cgttcaaaaca gacactcctg 660
 agtgatgaag atgctgaact tgtggagata gtgaaagaac ggcttcgtaa tccndrbst 720
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 gagcgggacg taaaggaaat gcgaaaagct ggctcgacgg tacgtgaaca gtgaaaaaag 840
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 gattgttaca agattaagct ccggtcttca ggctatcgcc ttgtatacca ggttatagac 960
 gagaaaagttg tcgttttctg gatttctgtt gggaaaaagag aacgctcgga agtatatagc 1020
 gaggndrcgg tcaaacgcac tctctgaacc aaagcatgac atctctgttt cgcaccgsta 1080
 rthkcrraag tgacacttct gctttgcgtt gacagaggaa gcaggctatg aagcagcaaa 1140
 agggcgatgt aatcgccctg atcgctcatc gttaaaccgt catagtgcgc gcactggtaa 1200
 cgaggaaaga cctctgcgag gtacgaatcc gaaccgndhk caccagacgc aggtcgctgt 1260
 cttcacagct tacgaacctg aggagtaaga gaccgcggcg gggagaaatc cctcgccacc 1320
 tctgatgtgg caggcatcct caacgcaccc gcacttaacc cgcttcggcg gggttttgtt 1380
 tttattttca arttcgcgtt tgaagtctcg gacggtgcgc gaataagaatc aaaaaactt 1440

aagt

<210> 10

<211> 88

<212> PRT

<213> Methanococcus jannaschii #2

<220>

<223> protein relE-Mj2

<400> 10

Met Lys Val Leu Phe Ala Lys Thr Phe Val Lys Asp Leu Lys His Val
 1 5 10 15
 Pro Gly His Ile Arg Lys Arg Ile Lys Leu Ile Ile Glu Glu Cys Gln
 20 25 30
 Asn Ser Asn Ser Leu Asn Asp Leu Lys Leu Asp Ile Lys Lys Ile Lys
 35 40 45
 Gly Tyr His Asn Tyr Tyr Arg Ile Arg Val Gly Asn Tyr Arg Ile Gly
 50 55 60
 Ile Glu Val Asn Gly Asp Thr Ile Ile Phe Arg Arg Val Leu His Arg
 65 70 75 80
 Lys Ser Ile Tyr Asp Tyr Phe Pro
 85

<210> 11

<211> 91

<212> PRT

<213> Methanococcus jannaschii #3

<220>

<223> protein relE-Mj3

<400> 11

Met Lys Gln Trp Lys Tyr Leu Leu Lys Lys Ser Phe Ile Lys Asp Leu
 1 5 10 15
 Lys Glu Leu Pro Lys Asn Ile Gln Glu Lys Ile Lys Lys Leu Val Phe
 20 25 30
 Glu Glu Ile Pro Asn Lys Asn Asn Pro Pro Glu Ile Pro Asn Val Lys
 35 40 45
 Lys Leu Lys Gly Ala Asp Ser Tyr Tyr Arg Ile Arg Val Gly Asp Tyr
 50 55 60
 Arg Ile Gly Phe Lys Tyr Glu Asn Gly Lys Ile Val Phe Tyr Arg Val
 65 70 75 80
 Leu His Arg Lys Gln Ile Tyr Lys Arg Phe Pro
 85 90

<210> 12

<211> 87

<212> PRT

<213> Archaeoglobus fulgidus #1

<220>

<223> protein relE-Af1

<400> 12

Met Phe Arg Val Val Val His Arg Lys Ala Thr Gln Glu Leu Lys Arg
 1 5 10 15
 Leu Lys Lys Ala His Leu Lys Lys Phe Gly Val Leu Leu Glu Thr Leu
 20 25 30
 Lys Thr Asp Pro Ile Pro Trp Lys Arg Phe Asp Val Lys Lys Ile Glu
 35 40 45
 Gly Glu Glu Asn Thr Tyr Arg Ile Arg Ile Gly Asp Phe Arg Val Ile
 50 55 60
 Tyr Phe Leu Asp Lys Pro Thr Lys Thr Val His Ile Leu Lys Val Glu
 65 70 75 80
 Arg Arg Gly Lys Val Tyr Asp
 85

<210> 13
 <211> 90
 <212> PRT
 <213> Methanococcus jannaschii #1

<220>
 <223> protein relE-Mjl

434
 <400> 13
 Met Lys Phe Asn Val Glu Ile His Lys Arg Val Leu Lys Asp Leu Lys
 1 5 10 15
 Asp Leu Pro Pro Ser Asn Leu Lys Lys Phe Lys Glu Leu Ile Glu Thr
 20 25 30
 Leu Lys Thr Asn Pro Ile Pro Lys Glu Lys Phe Asp Ile Lys Arg Leu
 35 40 45
 Lys Gly Ser Asp Glu Val Tyr Arg Val Arg Ile Gly Lys Phe Arg Val
 50 55 60
 Gln Tyr Val Val Leu Trp Asp Asp Arg Ile Ile Ile Arg Lys Ile
 65 70 75 80
 Ser Arg Arg Glu Gly Ala Tyr Lys Asn Pro
 85 90

<210> 14
 <211> 74
 <212> PRT
 <213> Bacillus thuringiensis

<220>
 <223> protein relE-Bt

<400> 14
 Met Lys Phe Ile Ala Lys Gln Glu Lys Gly Ile Gln Lys Arg Ile Ala
 1 5 10 15
 Glu Gly Leu Lys Gly Leu Leu Lys Ile Pro Pro Glu Gly Asp Ile Lys
 20 25 30
 Ser Met Lys Gly Tyr Thr Glu Leu Tyr Arg Leu Arg Ile Gly Thr Phe
 35 40 45
 Arg Ile Leu Phe Glu Ile Asn His Asp Glu Lys Val Ile Tyr Ile Gln
 50 55 60
 Ala Ile Gly Asn Arg Gly Asp Ile Tyr Lys
 65 70

<210> 15
 <211> 95
 <212> PRT
 <213> E. coli plasmid P307

<220>
 <223> protein relE-P307

<400> 15
 Met Arg Tyr Gln Val Lys Phe Arg Glu Asp Ala Leu Lys Glu Trp Gln
 1 5 10 15
 Lys Leu Asp Lys Ala Ile Gln Gln Gln Phe Ala Lys Lys Leu Lys Lys
 20 25 30
 Cys Cys Asp Asn Pro His Ile Pro Ser Ala Lys Leu Arg Gly Ile Lys
 35 40 45
 Asp Cys Tyr Lys Ile Lys Leu Arg Ala Ser Gly Phe Arg Leu Val Tyr
 50 55 60
 Gln Val Ile Asp Glu Gln Leu Ile Ile Ala Val Val Ala Val Gly Lys
 65 70 75 80
 Arg Glu Arg Ser Asp Val Tyr Asn Leu Ala Ser Glu Arg Met Arg
 85 90 95

<210> 16
 <211> 82
 <212> PRT
 <213> E. coli K-12

<220>
 <223> protein relEK-12

<400> 16
 Met Ala Tyr Phe Leu Asp Phe Asp Glu Arg Ala Leu Lys Glu Trp Arg
 1 5 10 15
 Lys Leu Gly Val Leu Glu Ser Pro Arg Ile Glu Ala Asn Lys Leu Arg
 20 25 30
 Gly Met Pro Asp Cys Tyr Lys Ile Lys Leu Arg Ser Ser Gly Tyr Arg
 35 40 45
 Leu Val Tyr Gln Val Ile Asp Glu Lys Val Val Val Phe Val Ile Ser
 50 55 60
 Val Gly Lys Arg Glu Arg Ser Glu Val Tyr Ser Glu Ala Val Lys Arg
 65 70 75 80
 Ile Leu

<210> 17
 <211> 96
 <212> PRT
 <213> Vibrio cholerae

<220>
 <223> protein relE-Vc

<400> 17
 Met Thr Tyr Lys Leu Glu Phe Lys Lys Ser Ala Leu Lys Glu Trp Lys

1 5 10 15
 Lys Leu Ala Val Pro Leu Gln Gln Gln Phe Lys Lys Lys Leu Ile Glu
 20 25 30
 Arg Leu Glu Asn Pro His Val Pro Ser Ala Lys Leu Ser Gly Ala Glu
 35 40 45
 Asn Ile Tyr Lys Ile Lys Leu Arg Gln Ser Gly Tyr Arg Leu Val Tyr
 50 55 60
 Gln Val Glu Asn Asp Ile Ile Val Val Thr Val Leu Ala Val Gly Lys
 65 70 75 80
 Arg Glu Arg Ser Glu Val Tyr Thr Lys Ala Leu Gln Arg Leu Asp Asp
 85 90 95

<210> 18
 <211> 87
 <212> PRT
 <213> Mycobacterium tuberculosis #1

<220>
 <223> protein relE-Mt1

<400> 18
 Met Pro Tyr Thr Val Arg Phe Thr Thr Thr Ala Arg Arg Asp Leu His
 1 5 10 15
 Lys Leu Pro Pro Arg Ile Leu Ala Ala Val Val Glu Phe Ala Phe Gly
 20 25 30
 Asp Leu Ser Arg Glu Pro Leu Arg Val Gly Lys Pro Leu Arg Arg Glu
 35 40 45
 Leu Ala Gly Thr Phe Ser Ala Arg Arg Gly Thr Tyr Arg Leu Leu Tyr
 50 55 60
 Arg Ile Asp Asp Glu His Thr Thr Val Val Ile Leu Arg Val Asp His
 65 70 75 80
 Arg Ala Asp Ile Tyr Arg Arg
 85

<210> 19
 <211> 97
 <212> PRT
 <213> Mycobacterium tuberculosis #2

<220>
 <223> protein relE-Mt2

<400> 19
 Met Ser Asp Asp His Pro Tyr His Val Ala Ile Thr Ala Thr Ala Ala
 1 5 10 15
 Arg Asp Leu Gln Arg Leu Pro Glu Lys Ile Ala Ala Ala Cys Val Glu
 20 25 30
 Phe Val Phe Gly Pro Leu Leu Asn Asn Pro His Arg Leu Gly Lys Pro
 35 40 45
 Leu Arg Asn Asp Leu Glu Gly Leu His Ser Ala Arg Arg Gly Asp Tyr
 50 55 60
 Arg Val Val Tyr Ala Ile Asp Asp Gly His His Arg Val Glu Ile Ile
 65 70 75 80
 His Ile Ala Arg Arg Ser Ala Ser Tyr Arg Met Asn Pro Cys Arg Pro
 85 90 95

Arg

<210> 20
<211> 102
<212> PRT
<213> Haemophilus influenzae

<220>
<223> protein RelE-Hi

<400> 20
Met Ser Glu Glu Lys Pro Leu Lys Val Ser Tyr Ser Lys Gln Phe Val
1 5 10 15
Arg Asp Leu Thr Asp Leu Ala Lys Arg Ser Pro Asn Val Leu Ile Gly
20 25 30
Ser Lys Tyr Ile Thr Ala Ile His Cys Leu Leu Asn Arg Leu Pro Leu
35 40 45
Pro Glu Asn Tyr Gln Asp His Ala Leu Val Gly Glu Trp Lys Gly Tyr
50 55 60
Arg Asp Cys His Ile Gln Gly Asp Leu Val Leu Ile Tyr Gln Tyr Val
65 70 75 80
Ile Gln Asp Glu Phe Asp Glu Leu Lys Phe Ser Arg Leu Asn Ile His
85 90 95
Ser Gln Thr Ala Leu Lys
100

<210> 21
<211> 92
<212> PRT
<213> E. coli K-12

<220>
<223> protein relEk12sos

<400> 21
Met Ile Gln Arg Asp Ile Glu Tyr Ser Gly Gln Tyr Ser Lys Asp Val
1 5 10 15
Lys Leu Ala Gln Lys Arg His Lys Asp Met Asn Lys Leu Lys Tyr Leu
20 25 30
Met Thr Leu Leu Ile Asn Asn Thr Leu Pro Leu Pro Ala Val Tyr Lys
35 40 45
Asp His Pro Leu Gln Gly Ser Trp Lys Gly Tyr Arg Asp Ala His Val
50 55 60
Glu Pro Asp Trp Ile Leu Ile Tyr Lys Leu Thr Asp Lys Leu Leu Arg
65 70 75 80
Phe Glu Arg Thr Gly Thr His Ala Ala Leu Phe Gly
85 90

<210> 22
<211> 88
<212> PRT
<213> Helicobacter pylori

<220>

<223> protein RelE-Hp

<400> 22

Met Leu Lys Leu Asn Leu Lys Lys Ser Phe Gln Lys Asp Phe Asp Lys
1 5 10 15
Leu Leu Leu Asn Gly Phe Asp Asp Ser Val Leu Asn Glu Val Ile Leu
20 25 30
Thr Leu Arg Lys Lys Glu Pro Leu Asp Pro Gln Phe Gln Asp His Ala
35 40 45
Leu Lys Gly Lys Trp Lys Pro Tyr Arg Glu Cys His Ile Lys Pro Asp
50 55 60
Val Leu Leu Val Tyr Leu Val Lys Asp Asp Glu Leu Ile Leu Leu Arg
65 70 75 80
Leu Gly Ser His Ser Glu Leu Phe
85

<210> 23

<211> 92

<212> PRT

<213> Archaeoglobus fulgidus #2

<220>

<223> protein RelE-Af2

<400> 23

Met Ala Trp Lys Val Arg Tyr His Lys Lys Ala Ile Lys Phe Leu Glu
1 5 10 15
Lys Leu Asp Glu Gly Lys Arg Ser Ile Leu Leu Ser Lys Ile Gln Glu
20 25 30
Leu Val Asn Ser Leu Glu Ser Gly Val Leu Pro Ile Gln Arg Met Asp
35 40 45
Ile Lys Arg Leu Lys Gly Val Trp Asp Gly Phe Leu Arg Leu Arg Val
50 55 60
Gly Glu Val Arg Ile Ile Phe Lys Ile Asn Val Glu Asp Glu Thr Ile
65 70 75 80
Phe Ile Tyr Ser Ile His Phe Arg Glu Lys Val Tyr
85 90

<210> 24

<211> 86

<212> PRT

<213> Archaeoglobus fulgidus #4

<220>

<223> protein RelE-Af4

<400> 24

Met Asn Glu Val Leu Ile His Lys Lys Phe Leu Asp Gly Leu Asp Ser
1 5 10 15
Gly Arg Arg Ser Lys Val Leu Asp Ala Ile Arg Met Leu Lys Asp Phe
20 25 30
Pro Ile Ile Arg Ala Asp Ile Lys Lys Ile Gly Pro Lys Thr Tyr Arg
35 40 45
Leu Arg Lys Gly Glu Ile Arg Ile Ile Phe Asp Phe Asp Ile Gly Thr

50 55 60
 Asn Arg Val Phe Val Lys Phe Ala Ala Ser Glu Gly Val Phe Thr Lys
 65 70 75 80
 Thr Glu Glu Lys Phe Phe
 85

<210> 25
 <211> 85
 <212> PRT
 <213> Archaeoglobus fulgidus #3

<220>
 <223> protein RelE-Af3

<400> 25
 Met Asn Tyr Lys Ala Gln Phe Ser Glu Glu Phe Leu Lys Ile Ala Lys
 1 5 10 15
 Lys Leu Lys Glu Lys Asp Pro Glu Leu Leu Lys Arg Leu Gln Ser Lys
 20 25 30
 Val Glu Glu Ile Ile Lys Gln Pro Glu His Tyr Lys Pro Leu Arg Gly
 35 40 45
 Gln Met Lys Gly Leu Arg Arg Ala His Val Gly Lys Phe Val Ile Ile
 50 55 60
 Phe Lys Val Glu Glu Asp Thr Val Lys Phe Val Thr Phe Lys His His
 65 70 75 80
 Asn His Ala Tyr Lys
 85

<210> 26
 <211> 120
 <212> PRT
 <213> Synechosystis

<220>
 <223> protein RelE-Sy

<400> 26
 Met Ser Asn Asn Leu His Leu Val Asn Ile Asp Phe Thr Pro Glu Tyr
 1 5 10 15
 Arg Arg Ser Leu Lys Tyr Leu Ala Lys Lys Tyr Arg Asn Ile Arg Ser
 20 25 30
 Asp Val Gln Pro Ile Ile Glu Ala Leu Gln Lys Gly Val Ile Ser Gly
 35 40 45
 Asp Arg Leu Ala Gly Phe Gly Ser Asp Ile Tyr Val Tyr Lys Leu Arg
 50 55 60
 Ile Lys Asn Ser Asn Ile Gln Lys Gly Lys Ser Ser Gly Tyr Arg Leu
 65 70 75 80
 Ile Tyr Leu Leu Glu Ser Glu Asn Ser Ile Leu Leu Leu Thr Ile Tyr
 85 90 95
 Ser Lys Ala Glu Gln Glu Asp Ile Ala Ala Ser Asp Ile Asn Ser Ile
 100 105 110
 Leu Gly Glu Tyr Ser Ile Glu Asp
 115 120

<210> 27
 <211> 86
 <212> PRT
 <213> Bacterium

<220>
 <223> protein RelB-SOS

<400> 27
 Met Ala Ala Asn Ala Phe Val Arg Ala Arg Ile Asp Glu Asp Leu Lys
 1 5 10 15
 Asn Gln Ala Ala Asp Val Leu Ala Gly Met Gly Leu Thr Ile Ser Asp
 20 25 30
 Leu Val Arg Ile Thr Leu Thr Lys Val Ala Arg Glu Lys Ala Leu Pro
 35 40 45
 Phe Asp Leu Arg Glu Pro Asn Gln Leu Thr Ile Gln Ser Ile Lys Asn
 50 55 60
 Ser Glu Ala Gly Ile Asp Val His Lys Ala Lys Asp Ala Asp Asp Leu
 65 70 75 80
 Phe Asp Lys Leu Gly Ile
 85

<210> 28
 <211> 82
 <212> PRT
 <213> Vibrio cholerae

<220>
 <223> protein RelB-Vc

<400> 28
 Met Thr Thr Arg Ile Leu Ala Asp Val Ala Ala Ser Ile Thr Glu Phe
 1 5 10 15
 Lys Ala Asn Pro Met Lys Val Ala Thr Ser Ala Phe Gly Ala Pro Val
 20 25 30
 Ala Val Leu Asn Arg Asn Glu Pro Ala Phe Tyr Cys Val Pro Ala Ser
 35 40 45
 Thr Tyr Glu Ile Met Met Asp Lys Leu Glu Asp Leu Glu Leu Leu Ala
 50 55 60
 Ile Ala Lys Glu Arg Leu Ser Glu Asp Ser Val Ser Val Asn Ile Asp
 65 70 75 80
 Asp Leu

<210> 29
 <211> 83
 <212> PRT
 <213> Bacillus thurigiensis

<220>
 <223> protein RelB

<400> 29
 Met Pro Asn Ile Ile Leu Ser Asp Thr Ser Ala Ser Val Ser Glu Leu
 1 5 10 15

Lys Lys Asn Pro Met Ala Thr Val Ser Ala Gly Asp Gly Phe Pro Val
 20 25 30
 Ala Ile Leu Asn Arg Asn Gln Pro Ala Phe Tyr Cys Val Pro Ala Glu
 35 40 45
 Leu Tyr Glu Lys Met Leu Asp Ala Leu Asp Asp Gln Glu Leu Val Lys
 50 55 60
 Leu Val Ala Glu Arg Ser Asn Gln Pro Leu His Asp Val Asp Leu Asp
 65 70 75 80
 Lys Tyr Leu

<210> 30
 <211> 93
 <212> PRT
 <213> Mycobacterium tuberculosis #1

<220>
 <223> protein RelB-Mt1

<400> 30
 Met Arg Ile Leu Pro Ile Ser Thr Ile Lys Gly Lys Leu Asn Glu Phe
 1 5 10 15
 Val Asp Ala Val Ser Ser Thr Gln Asp Gln Ile Thr Ile Thr Lys Asn
 20 25 30
 Gly Ala Pro Ala Ala Val Leu Val Gly Ala Asp Glu Trp Glu Ser Leu
 35 40 45
 Gln Glu Thr Leu Tyr Trp Leu Ala Gln Pro Gly Ile Arg Glu Ser Ile
 50 55 60
 Ala Glu Ala Asp Ala Asp Ile Ala Ser Gly Arg Thr Tyr Gly Glu Asp
 65 70 75 80
 Glu Ile Arg Ala Glu Phe Gly Val Pro Arg Arg Pro His
 85 90

<210> 31
 <211> 89
 <212> PRT
 <213> Mycobacterium tuberculosis #2

<220>
 <223> protein RelB-Mt2

<400> 31
 Met Ala Val Val Pro Leu Gly Glu Val Arg Asn Arg Leu Ser Glu Tyr
 1 5 10 15
 Val Ala Glu Val Glu Leu Thr His Glu Arg Ile Thr Ile Thr Arg His
 20 25 30
 Gly His Pro Ala Ala Val Leu Ile Ser Ala Asp Asp Leu Ala Ser Ile
 35 40 45
 Glu Glu Thr Leu Glu Val Leu Arg Thr Pro Gly Ala Ser Glu Ala Ile
 50 55 60
 Arg Glu Gly Leu Ala Asp Val Ala Ala Gly Arg Phe Val Ser Asn Asp
 65 70 75 80
 Glu Ile Arg Asn Arg Tyr Thr Ala Arg
 85

<210> 32
 <211> 97
 <212> PRT
 <213> E. coli K-12

<220>
 <223> protein RelB-K12-2

<400> 32
 Met His Arg Ile Leu Ala Glu Lys Ser Val Asn Ile Thr Glu Leu Arg
 1 5 10 15
 Lys Asn Pro Ala Lys Tyr Phe Ile Asp Gln Pro Val Ala Val Leu Ser
 20 25 30
 Asn Asn Arg Pro Ala Gly Tyr Leu Ser Ala Ser Ala Phe Glu Ala
 35 40 45
 Leu Met Asp Met Leu Ala Glu Gln Glu Glu Lys Lys Pro Ile Lys Ala
 50 55 60
 Arg Phe Arg Pro Ser Ala Ala Arg Leu Glu Glu Ile Thr Arg Arg Ala
 65 70 75 80
 Glu Gln Tyr Leu Asn Asp Met Thr Asp Asp Phe Asn Asp Phe Lys
 85 90 95
 Glu

<210> 33
 <211> 68
 <212> PRT
 <213> Salmonella typhimurium

<220>
 <223> protein RelB-St

<400> 33
 Met Phe Met Arg Thr Val Asn Tyr Ser Glu Ala Arg Gln Asn Leu Ala
 1 5 10 15
 Glu Val Leu Glu Ser Ala Val Thr Gly Gly Pro Val Thr Ile Thr Arg
 20 25 30
 Arg Gly His Lys Ser Ala Val Ile Ser Ala Glu Glu Phe Glu Arg
 35 40 45
 Tyr Gln Thr Ala Arg Met Asp Asp Glu Phe Ala Ala Ile Met Ala Val
 50 55 60
 His Gly Asn Glu
 65

<210> 34
 <211> 79
 <212> PRT
 <213> E. coli

<220>
 <223> protein RelB-coli

<400> 34
 Met Gly Ser Ile Asn Leu Arg Ile Asp Asp Glu Leu Lys Ala Arg Ser

1 5 10 15
 Tyr Ala Ala Leu Glu Lys Met Gly Val Thr Pro Ser Glu Ala Leu Arg
 20 25 30
 Leu Met Leu Glu Tyr Ile Ala Asp Asn Glu Arg Leu Pro Phe Lys Gln
 35 40 45
 Thr Leu Leu Ser Asp Glu Asp Ala Glu Leu Val Glu Ile Val Lys Glu
 50 55 60
 Arg Leu Arg Asn Pro Lys Pro Val Arg Val Thr Leu Asp Glu Leu
 65 70 75

<210> 35
 <211> 98
 <212> PRT
 <213> Haemophilus influenzae

<220>
 <223> protein RelB-Hi

<400> 35
 Met Ala Leu Thr Asn Ser Ser Ile Ser Phe Arg Thr Val Glu Lys Thr
 1 5 10 15
 Lys Leu Glu Ala Tyr Gln Val Ile Glu Gln Tyr Gly Leu Thr Pro Ser
 20 25 30
 Gln Val Phe Asn Met Phe Leu Ala Gln Ile Ala Lys Thr Arg Ser Ile
 35 40 45
 Pro Val Asp Leu Asn Tyr Leu Arg Pro Asn Lys Glu Thr Leu Ala Ala
 50 55 60
 Ile Asp Glu Leu Asp Ser Gly Asn Ala Glu Ser Phe Ile Glu Ala
 65 70 75 80
 Ser Glu Asn Tyr Ser Ala Glu Glu Phe Thr Lys Arg Ile Leu Asn Gly
 85 90 95
 Gly Gln

<210> 36
 <211> 82
 <212> PRT
 <213> Methanococcus jannaschii

<220>
 <223> protein RelB-Mj

<400> 36
 Met Leu Asn Ile Asn Lys Glu Ile Ala Gln Ile Glu Thr Glu Leu Asn
 1 5 10 15
 Glu Leu Lys Lys Leu Arg Asp Glu Ile Ser Glu Arg Ile Glu Lys Leu
 20 25 30
 Glu Ile Lys Leu Leu Lys Leu Lys Ala Leu Ala Ile Pro Glu Glu Glu
 35 40 45
 Phe Glu Glu Asp Tyr Glu Glu Ile Ile Glu Asp Val Lys Lys Ser Leu
 50 55 60
 Asp Lys Lys Glu Thr Val Pro Ala Glu Glu Ala Leu Lys Glu Leu Gly
 65 70 75 80
 Leu Leu

<210> 37
 <211> 65
 <212> PRT
 <213> Archaeoglobus fulgidus #1

<220>
 <223> protein RelB-Af1

<400> 37
 Met Asn Glu Ala Leu Leu Arg Glu Ile Tyr Ser Glu Val Lys Lys Ile
 1 5 10 15
 Arg Glu Lys Ile Glu Gln Leu Glu Glu Ile Ile Pro Ala Glu Lys
 20 25 30
 Val Ser Glu Glu Leu Leu Glu Ile Arg Lys Leu Lys Glu Glu Ser
 35 40 45
 Leu Lys Gly Glu His Val Asp Trp Asp Glu Leu Lys Arg Glu Leu Gly
 50 55 60
 Val
 65

<210> 38
 <211> 72
 <212> PRT
 <213> Archaeoglobus fulgidus #3

<220>
 <223> protein RelB-Af3

<400> 38
 Met Lys Val Leu Leu Asp Ile Ile Glu Asp Ile Glu Asn Phe Ile Arg
 1 5 10 15
 Gln Leu Glu Lys Arg Arg Gly Glu Leu Glu Glu Lys Asp Glu Ile
 20 25 30
 Leu Ile Phe Ser Asp Ala Glu Phe Ile Asp Ser Ile Gln Arg Gly Leu
 35 40 45
 Ser Asp Leu Glu Gln Gly Arg Ser Lys Val Cys Ser Asn Leu Glu Glu
 50 55 60
 Val Lys Lys Leu Phe Glu Asp Ile
 65 70

<210> 39
 <211> 62
 <212> PRT
 <213> Archaeoglobus fulgidus #2

<220>
 <223> protein RelB-Af2

<400> 39
 Met Glu Val Ile Gln Ile Ser Lys Asp Glu Leu Glu Glu Ile Ile Glu
 1 5 10 15
 Arg Lys Phe Lys Glu Val Leu Ile Lys Ala Leu Met Glu Ile Thr Pro
 20 25 30

Tyr Val Ser Asp Glu Glu Gln Glu Glu Ile Asp Lys Ile Ala Gly Lys
 35 40 45
 Pro Asp Glu Tyr Glu Gly Glu Phe Glu Glu Trp His Gly Lys
 50 55 60

<210> 40
 <211> 57
 <212> PRT
 <213> Archaeoglobus fulgidus #4

<220>
 <223> protein RelB-Af4

<400> 40
 Met Asp Ile Gln Val Ile Lys Gln Ala Val Arg Glu Val Leu Arg Glu
 1 5 10 15
 Glu Leu Pro Ser Ile Leu Lys Glu Val Ile Leu Ser Thr Ile Pro Pro
 20 25 30
 Asp Glu Pro Glu Ala Asp Glu Lys Gln Phe Val Asp Glu Glu Ile Asn
 35 40 45
 Glu Asp Asp Tyr Val Lys Phe Asp Glu
 50 55

<210> 41
 <211> 95
 <212> PRT
 <213> Helicobacter pyloris

<220>
 <223> protein RelB-Hp

<400> 41
 Met Pro Asn Thr Thr Asn Lys Asp Tyr Thr Lys Tyr Ser Gln Arg Gln
 1 5 10 15
 Leu Phe Ser Phe Leu Asn Ser Ile Lys Thr Lys Gln Lys Arg Ala Leu
 20 25 30
 Glu Lys Leu Lys Glu Ile Gln Ala Gln Lys Gln Arg Ile Lys Lys Ala
 35 40 45
 Leu Gln Phe Lys Ala Leu Asn Leu Thr Glu Asn Gly Tyr Thr Ile Glu
 50 55 60
 Glu Glu Arg Glu Ile Leu Ala Arg Ala Lys Asp Thr Lys Asn Arg Leu
 65 70 75 80
 Cys Phe Lys Ser Ile Glu Asp Phe Lys Lys His Cys Glu Asn Leu
 85 90 95

<210> 42
 <211> 86
 <212> PRT
 <213> Synechosystis

<220>
 <223> protein RelB-syneco

<400> 42

Met Met Arg Ala Phe Glu Val Met Ala Thr Val Lys Asp Ser Lys Gln
 1 5 10 15
 Leu Leu Leu Asp Ser Asp Leu His Trp Asn Thr Ser Arg Val Lys Val
 20 25 30
 Ile Ile Leu Glu Ser Asp Glu Leu Ala Ser Lys Gly Ser Glu Phe Asp
 35 40 45
 Pro Asp Asp Thr Pro Val Glu Glu Ile Lys Val Ser Leu Arg Lys Ala
 50 55 60
 Leu Glu Glu Tyr Lys Gln Gly Lys Arg Ile Pro Val Glu Asn Met Trp
 65 70 75 80
 Glu Gly Ile Asp Val Glu
 85

<210> 43
 <211> 85
 <212> PRT
 <213> Bacillus thuringiensis

<220>
 <223> protein RelB-BT

<400> 43
 Met Ala Ile Arg Lys Asp Glu Leu Tyr Arg Leu Ile Asp His Leu Asp
 1 5 10 15
 Gln Gln Asp Glu Lys Ala Ala Phe Asp Phe Leu Glu Phe Leu Val Gln
 20 25 30
 Arg Ser Arg Arg Lys Pro Lys Glu Trp Glu Lys Ile Asp Met Ala Asp
 35 40 45
 Pro Asp His Glu Pro Leu Ser Thr Gln Glu Leu Glu Gln Leu Asn Ser
 50 55 60
 Glu Glu Gly Tyr Val Ser Gly Glu Asp Ala Lys Arg Glu Phe Gly Leu
 65 70 75 80
 Gln Ile Asp Leu Pro
 85

<210> 44
 <211> 1280
 <212> DNA
 <213> E. coli plasmid P307

<220>
 <223> n = A,T,C or G

<400> 44
 gaggatcata ttaggatagc ggtgggtgac gcccaacctct ggcatagaac ggacattcat 60
 tgatgccatg ccagaatgga cggttcagggt attccgtcca gttctgctgg caacgcgaga 120
 tctcccctgg tatagtgatg ccacagcaaa gcgctcaaac agggataata tgatggaaat 180
 caaggctcaa cagttttgtc acatcaacgg ggcgcgaagt ccttactgac aacggacaac 240
 aaggtatggc cggcgtggcg ggtatcggtt ccacgactga aaagcatcag gggcgcgtgg 300
 cggaagcgat ttttgcgaac tgcgcggaac tggataacga ccagcttaac gagatcatcg 360
 agtgggttcg gctctatcag cgtggaatgc cactatcagg ctgcgcgaac ggcctttttt 420
 acgccccttg ttaattccc gcaactacctg gacgttcagg tgattctgtc catctgtaca 480
 aaaaaaata aaagacttgt rbmrnataac aggtcatgta aggagtatct ttgagactgg 540
 ttaaacagtc ttgaaasdst atrrbggtgg cctatgccta acattattct cagtgtatca 600
 agcgccagtg tcagcagagct gaagaaaaaac ccgatggcga cagtcagcgc cggatgatgg 660

ttcccggtcg ctatccctgaa ccgtaaatcag cctgctttct actgtgtacc cgcagagctg 720
 tacgaaaaga tgcttgatgc cctagacgat caggagtgtg ttaasdcctg gtgagccgaac 760
 gcagcaacca acccgctgcat gatgtagatc tggataandr bstarttrata cctatgaggt 840
 atcagggtaaa attcagggaa gatgcgctga aagagtggca aaaactggac aaggctattc 900
 agcaacagtt tgcgaaaaag ctaaaaaagt gctgtgacaa tccgcatatt ccttccgcaa 960
 aactgcgtgg aactgcgtgg tgctacaaaa taaaattacg tgcgtcagggt ttctgcctgg 1020
 tctatcaggt gattgacgaa caattaatta tgcgtgtgt agctgtgggt aaacgtgndr 1080
 agcgagctga cggtttataat cttgccagcg aaagaatgag ataaaaagcaa taacacacaga 1140
 aagttactct ggcgttatgg ggtaatgcaa agtatgagtc gttagaggaa ttgcttggtat 1200
 aattgcgcga tggaaaagat ctttcgcagc cttaaaaagt aatggcttcc gaaaggtggt 1260
 tatggtgatt tttagccatgc

<210> 45

<211> 1168

<212> DNA

<213> B. thurigiensis

<220>

<223> n = A,T,C or G

<400> 45

ctgctttttt ctgttggtac aaacttaatt gattttgaat aatttggtt taccagtcct 60
 ttttgcttag cccagctcaa ataactgttg attgaattaa tgcgccggtt aatcgtagaa 120
 gggttttagta actcttgtaac ttgcatatgc cctcgatata gagcaatagt gcgagccgta 180
 actcttattg gatgaaaaag agtatcctca gcatgttttc cccacacatt ttcaaaccaa 240
 aatacaaaat ctttttaaat actcgtatat tcttttagtg tttttagtg caaatctcct 300
 tcttgagata agctagaaat aaaaatcgga atcaaatgat ttgcttgat agaaattggt 360
 ttagtggatg gcataaatat ctctcttttt attgacttac rbbtmrnaat tagcgagcat 420
 gatattttaa tctttataat tatgttagcg gacatcaaac atttatttcc ccaacttca 480
 tgtccactaa tattaattag tggacattrr dstarttrba aaactatctc gaaagttagt 540
 gtaacacatg gctattcgta aagatgaatt gtatcggtta attgatcacc tggatcaaca 600
 agatgaaaaa gcagcatatt actttttaga atttcttgtt caacggtcaa gaagaaaacc 660
 taaagaatgg gaaaaaattg atatggcaga tctgtatcat gaacccgtgt ctacacaaga 720
 gttagaagtg ttaaacagtg aagaaggata tgtatcaggg gaggcgcnd rstarttraa 780
 aacgtgaatt cggactacaa attgatttac cataagtcgg cggtgaaatt tattgcaaa 840
 caagaaaaag ggattcaaaa aagaattgca gaaggattga agggacttct taagattcct 900
 cctgaaggag atattaaaag tatgaaaggt tacacagaac tatatcgatt acggattgga 960
 acctttcgaa tttttattga aataaatcat gatgagaag tcatatacat acaagcaatt 1020
 ggaaatcgnd trggtgacat ctataaatat ggcaaacatg cattttttaa agaaaggtct 1080
 tctgaatgca agaactcttc ttttttgtgt gcgaataatg tccgctaagt cttgttgcgt 1140
 gattctgttc cattgctaca catacccc

<210> 46

<211> 1024

<212> DNA

<213> Methanococcus jannaschii

<220>

<223> n = A,T,C or G

<400> 46

ccgataccgt tgctggagac atagctggag ctttgaaggc ggagaagctt attttaataa 60
 cagatgttga tggaaataat gatgatataa ataataccaga gacgttgcat agaaaataa 120
 cagcttcaga actaaaaaga atgatagaag atggaagaat aaagggaggg atgattccaa 180
 aggcgtgaag tgccttatat gccttagacat atggagttaa agcggttcat ataataaagt 240
 gaaagattcc tcatgctttg ttgttgagga tatttacaga ggagggtatt gggacgatga 300
 taacaagaga ttaaaagttt tatattataa actacttaag aattaaaata starttrbmag 360

acaaataagg ggataactat gctcaatata aacaaagaga tagcacaaat agaaactgaa 420
 ttgaatgaat tgaaaaaatt gagagatgaa atctctgaaa ggattgaaaa attagaaata 480
 aagttattaa aattgaaagc attagctatt ccagaggagg aatttgaaag ggattatgaa 540
 . gaaattatag aagatgttaa aaaatctctg gataaaaaag agactgtgcc agcagaagag 600
 gctttgaand rbmstartcm agaattggga ttattatgaa gttaaactgtt gagatacata 660
 aaagagtctt aaaagattta aaggatttgc ctccctcaaa cttaaagaag tttaaagaac 720
 taatagaaac attaaaaacc aatcccattc caaaagaaaa atttgatatt aaaagattaa 780
 aaggcagtgta tgagggtttat agagttagaa ttggaaaatt tagagttcaa tatgtgtttt 840
 tatgggatga tagaataata ataattagaa ndrmagataa gtagaagaga agggagcttat 900
 aaaaatccct aagctattaa aaattctaat ggctacattt ttatatctct tttcttaatt 960
 caaatagaaa aaacagattc ggctgatacc atgattattc ttttagattt aaatggaaca 1020
 atag 1024

<210> 47
 <211> 28
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer Mj-relE/2CW was used for amplification of
 relE gene from M. jannaschhii genomic DNA

<400> 47
 cccccgaatt cgcatgcgcc attagaat 28

<210> 48
 <211> 37
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer Mj-relE/1CW was used for amplification of
 relE gene from M. jannaschhii genomic DNA

<400> 48
 cccccgatc cgagctcgag gctttgaaag aattggg 37

<210> 49
 <211> 38
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer relB-J.jannCW was used for amplification of
 relB and relE from M. jannaschhii

<400> 49
 ccccgatcc gtcgacgaca aataagggga taactatg 38

<210> 50
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer relE-Sp2/CW was used for amplification of
 relESP2 gene from S. pneumoniae genomic DNA

<400> 50
 ccccgatcc gatgcatgat ttaggcttga ag 32
 <210> 51
 <211> 34
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> primer relE-Sp2/CCW was used for amplification of
 relESP2 gene from *S. pneumoniae* genomic DNA
 <400> 51
 cccgaattc gaatgaaat ttacttgaaa aaag 34
 <210> 52
 <211> 58
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> primer relEk12 was used for the amplification of
 DNA fragments comprising genes relEK-12, relEP307
 and relEMj
 <400> 52
 tgtaatacga ctactatag ataaggagtt ttataaatgg cgtattttct ggattttg 58
 <210> 53
 <211> 19
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> primer P2 was used for the amplification of DNA
 fragments comprising genes relEK-12, relEP307 and
 relEMj
 <400> 53
 caccttcggt gcgaaacag 19
 <210> 54
 <211> 58
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> primer relEP307 was used for the amplification of
 DNA fragments comprising genes relEK-12, relEP307
 and relEMj
 <400> 54
 tgtaatacga ctactatag ataaggagtt ttataaatga ggtatcaggt aaaattca 58
 <210> 55
 <211> 20

<212> DNA
<213> Artificial Sequence

<220>
<223> primer P4 was used for the amplification of DNA fragments comprising genes relEK-12, relEP307 and relEMj

<400> 55
ctttccatcg gcgaattatc 20

<210> 56
<211> 58
<212> DNA
<213> Artificial Sequence

<220>
<223> primer relEMj was used for the amplification of DNA fragments comprising genes relEK-12, relEP307 and relEMj

<400> 56
tgtaatacga ctcaatatag ataaggagtt ttataaatga agtttaacgt tgagatac 58

<210> 57
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> primer P6 was used for the amplification of DNA fragments comprising genes relEK-12, relEP307 and relEMj

<400> 57
atcatggtat cagccgaatc 20

<210> 58
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> primer S-relE was used for the amplification of the relE coding region from the plasmid pMG223

<400> 58
taggtaccat ggcgtatttt ctgg 24

<210> 59
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> primer AS-relE was used for the amplification of the relE coding region from the plasmid pMG223

<400> 59

gagacccac actaccatcg gcg

23

22
